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71 Applicant: Escher Wyss GmbH, 7980 Ravensburg

72 Inventor: Margreiter, Hans, Feuerthalen (Switzerland)

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Publications to be considered in judging patentability:

FR 6 48 922

FR 13 06 193

US 21 93 706

US 25 73 615

US 27 93 186

US 29 13 116

Escher Wyss GmbH, Ravensburg (Wuerttemberg)

Decanter

The invention relates to a decanter for clarifying a heavy liquid, which decanter, within a container, exhibits a plurality of stacked, inclined floors that among themselves form individual separating spaces which run between the clarified liquid shaft for collecting the clarified liquid and a sediment shaft for collecting the sediment, which separating spaces connect on one side to the sediment shaft and on the other side to the clarified liquid shaft by means of a channel that runs from the clarified liquid zone of the separating space to the clarified liquid shaft, while the heavy liquid zones of the separating spaces connect to a feed line.

Decanters of this type are used when the separation of materials from the heavy liquid can be performed statically through sedimentation. In the design of these decanters it is advantageous if the separating areas are rotationally symmetrical circular spaces and the floors exhibit the shape of a truncated cylinder shell, and if the channel leading from the clarified liquid zone to the clarified liquid shaft is formed by inserting an intermediate wall that runs at a distance from the floor.

However, in the case of some heavy liquids that require treatment, incrustations form in the decanter, and the decanter's throughput capacity gradually drops, until operation of the decanter must be stopped and the decanter cleaned at considerable expense or replaced by a new decanter. Involved here are relatively large devices (e.g., three meters in diameter), whose cost increases with the size.

The invention is based on the problem of creating a decanter for clarifying a heavy liquid, a decanter whose service life is longer and whose design is simpler and for which the throughput capacity can be increased.

This problem is solved in a decanter of the initially indicated type, in that the separating spaces are divided from the clarified liquid shaft by a removable wall, with the exception of the opening of the channel leading from the clarified liquid zone to the clarified liquid shaft.

An advantageous decanter is provided when the removable wall can be moved in a vertical direction or when the removable wall consists of at least two removable parts.

Producing the removable wall from a flexible material will yield a simple design for the removable wall and one that provides a particularly good seal.

An increase in the throughput capacity of the decanter can be achieved when the removable wall is a wall that is permeable to the clarified liquid but at least hinders the passage of the sedimentary particles in the heavy liquid.

Another advantageous embodiment of the permeable removable wall results when the wall is produced from a filter cloth.

The advantages, as well as the design and operation, of the inventive decanter will next be described and explained in greater detail on the basis of the five figures provided in the attached drawing. Shown are:

Fig. 1 an embodiment of the decanter in schematic axial view

Figs. 2, 3, 4, and 5 embodiments of the removable wall, with enlarged detail

The decanter shown in fig. 1 exhibits a container 1, in which a plurality of floors 2 are stacked on top of each other. The floors 2 are inclined and between themselves form separating spaces 3. The floors 2 have the shape of a truncated cone shell and thus form among themselves separating spaces 3 that are rotationally symmetric.

The separating spaces 3 extend between a clarified liquid shaft 4 that collects the clarified liquid separated from the heavy liquid being treated and a sediment shaft 5 that collects the sediment from the heavy liquid. The uppermost floor is designed as a lid 22 and divides the clarified liquid shaft 4 from the sediment shaft 5. The lowermost floor 23 simultaneously forms the floor of the container 1.

The separating spaces 3 run parallel to each other and connect with the sediment stack 5 into which the sediment slides. At the same time, the separating spaces 3 connect with the clarified liquid shaft 4, also in parallel fashion, specifically by means of a channel 6, which

leads from the clarified liquid zone 7 of the given separating space 3, through the separating space to the clarified liquid shaft 4. This channel 6 is formed in the given separating space 3 by adding an intermediate wall 8 that runs at a distance from the floor 2. By means of a feed line 9 the heavy liquid is introduced into the separating spaces 3, which connect in parallel fashion with this feed line 9, by means of connecting holes 15.

The heavy liquid to be treated passes through the feed line 9 into the separating space 3, where a heavy liquid zone 10 initially forms. A sediment zone 11 and a clarified liquid zone 7 gradually form along the inclined floor 2.

The separating spaces 3 are divided from the clarified liquid shaft 4 by a removable wall 12, while the opening 13 of the channel 6, which leads from the clarified liquid zone 7 to the clarified liquid shaft 4, remains open.

As fig. 2 shows in detail, the removable wall 12 is provided with a projection 14, by means of which the removable wall 12 hangs on the intermediate wall 8 and divides the separating space 3, or its heavy liquid zone 10, from the clarified liquid shaft 4. The removable ring-shaped wall 12 can be pushed upward, in the direction of the arrow, with the result that the separating space 3 becomes accessible for any necessary interventions, e.g., to remove incrustations.

This wall 12 can also be designed so as to consist of at least two parts, each of which can be moved to the side, away from the separating space 3. This embodiment of the removable wall 12 is not shown in the drawing. In a very simple design the removable wall 12 can also be produced from a flexible material, e.g., rubber. A strip produced from rubber is then stretched over the circumference of the intermediate wall 8 and the floor 2, to cover the separating space 3. This version of the wall 12 is shown in fig. 3.

It was discovered that the throughput capacity of the decanter can be increased not only by directing the flow of clarified liquid through the channel 6 but also by allowing it to partially branch off from the heavy liquid zone 10 in the direction of the clarified liquid shaft 4. This is possible when the removable wall 12 is permeable to the clarified liquid but at least hinders the passage of sedimentary particles, as is the case when a Venetian blind configuration is used, as depicted in fig. 4. This kind of Venetian blind configuration exhibits panels 15, which are supported by hangers 16. This Venetian blind wall 12 is particularly

suited to decanters which are composed of separating spaces with a rectangular ground plan.

The removable wall 12 shown in fig. 5 is produced from a filter cloth. The removable wall forms a filter cloth strip, which is provided at its rims with strings 17. The strings 17 hold the cloth strip to the rims of the intermediate wall 8 and to the rims of the floor 2.

Serving as a support for the removable wall 12 is a ring-shaped projection 18 on the lowest floor 23.

The container 1 is divided at the point marked 19, and it is thus possible to remove the sides of the container 1. It would also be possible to introduce the feed line into the container 1 in a manner different from that shown in fig. 1, namely from below, through the lowest floor 23.

Patent Claims

1. A decanter for clarifying a heavy liquid, which decanter, within a container, exhibits a plurality of stacked, inclined floors that among themselves form individual separating spaces which run between the clarified liquid shaft for collecting the clarified liquid and a sediment shaft for collecting the sediment, which separating spaces connect on one side to the sediment shaft and on the other side to the clarified liquid shaft by means of a channel that runs from the clarified liquid zone of the separating space to the clarified liquid shaft, while the heavy liquid zones of the separating spaces connect to a feed line, wherein the separating spaces (3) are separated from the clarified liquid shaft (4) by means of a removable wall (12), with the exception of the opening (13) of the channel (6) leading from the clarified liquid zone (7) to the clarified liquid shaft (4).
2. A decanter according to claim 1, wherein the removable wall (12) is designed so as to permit movement in the vertical direction.
3. A decanter according to claim 1, wherein the removable wall (12) consists of at least two parts, which can be removed.
4. A decanter according to claim 1, wherein the removable wall (12) is produced from a flexible material.
5. A decanter according to claim 1, wherein the removable wall (12) is a wall which is permeable to the clarified liquid, but at least hinders the passage of the sedimentary particles of the heavy liquid.
6. A decanter according to claim 5, wherein the removable wall (12) is a wall formed by a Venetian blind.
7. A decanter according to claim 5, wherein the removable wall (12) is produced from a filter cloth.